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Similar problems confront the botanist. Just as boys gather eggs and butterflies, girls make large bouquets of wild flowers and are often encouraged by the advice that 'the more they pick, the more there will be.' There is a mercenary motive also, for the arbutus, fringed gentian and sabbatia among others are tied in compact bunches and sold in the cities,—a practice which might properly be prevented by law. The mayflower is so protected in Connecticut. To prevent thoughtless and wilful destruction there are at least two important organizations, *The Wild Flower Preservation Society of America*, and the *Society for the Protection of Native Plants*. The officers of the latter are among the most eminent botanists of New England and its membership is about seventeen hundred. The *Naturalist* has received copies of its leaflets which are widely circulated without charge. They urge that the roots of plants shall not be disturbed, and protest particularly against the destruction of arbutus, gentians, Christmas evergreens,—mountain laurel and ground pine, various orchids, and all the rarer flowers, even by botanists. For decorative purposes daisies and buttercups may be gathered indiscriminately. Asters and goldenrod may be taken freely, except that flowers by the roadside should be left for general enjoyment. They quote Ruskin,—“Flowers seem intended for the solace of ordinary humanity; children love them; quiet contented ordinary people love them as they grow; luxurious and disorderly people rejoice in them gathered. . . .”

All of these efforts for the preservation of native plants and animals indicate the progress of natural science. They are based, not upon sentiment, but upon a more intelligent appreciation of nature; and they deserve success.

F. T. L.

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## ZOOLOGY

**The Curious Mating Habit of the Fly *Rivellia boscii*.**—The following observations were made near Toronto in the latter part of June. The flies were found in bright sunlight about noon on leaves of bushes and flowers in a garden border. The behavior of four pairs only will be described for though other pairs were seen going through similar movements, only four were watched from their first meeting until separation. In all cases the female runs about on the leaves in small circles and spirals varied by an occasional straight course. The wings are extended and moved slowly up and down; at intervals

she stops for a second or two and then goes on. The male who is much smaller follows closely and when the pace admits touches her abdomen with his proboscis or with one of his anterior pair of legs. Sooner or later he mounts the back of the female, the penis is extended and taps the abdomen of the female two or three times when the latter also becomes extended and copulation begins. This extension of the female's abdomen is necessary to connection and seems purely automatic, for it invariably occurs even when her previous and subsequent actions show that the male's attentions are not acceptable.

*Pair I.* In copula the wings keep in constant motion, while at intervals of three or four minutes a period of greater excitement arrives during which the wings of both are moved more rapidly and their probosces are alternately extended and retracted. After a few seconds of this excitement a droplet of colorless fluid appears at the end of the proboscis of the male and rapidly increases in size until from one-half to two-thirds of a millimeter in diameter. This is not a bubble but a solid globule. The male now raises his proboscis as high as possible and lurching forward with his body, brings it down with a sweep and transfers the globule to the proboscis of the female which she elevates to receive it. The movement is rapid and very deft. Under movements of the female's proboscis the globule now dwindles and disappears; evidently she eats it. This transference of a globule is repeated many times before the pair separate. The male maintains his position chiefly by grasping the abdomen of the female with the second pair of legs, the first pair resting either on abdomen or thorax.

*Pair II.* The male succeeded several times in mounting but each time was dislodged by the female by movements of her legs and whole body. Male number two appeared on the scene and mounting was allowed to remain. Male number one endeavored to displace him but failing several times, soon went off. After the first globule had been handed over by male number two he dismounted of his own accord and went off.

*Pair III.* After handing over the globule the male would dismount of his own choice and run in circles around the female who remained almost stationary. After three or four minutes he would mount, the globule would appear at once and be handed over as usual. This occurred many times in succession.

*Pair IV.* The globule would appear as usual but with less excitement on the part of the male, as shown by sluggish movements or none at all, of wings, legs, and proboscis. After appearing and increasing to the usual size it would decrease, evidently being consumed by

the male himself. This occurred five times in succession. At intervals the female struggled to rid herself of him but did not succeed. The sixth time that the globule appeared was immediately after one of these struggles; this time the globule was handed over but the male dismounted at once of his own accord and went off.

The habit itself is curious enough, but no less interesting are the variations noted and the decided imperfection of instinct in the male of pair number four. The apparent choice exerted by the female of pair number two, and the whole behavior of the pairs gave an impression that could not be harmonized with any theory of insect behavior that considered insects pure automata.

Another point of interest is the possible connection between these globules and those referred to by J. M. Aldrich and L. A. Turley in an article entitled "A balloon-making fly" (*Amer. Nat.*, 1899, vol. 33, pp. 809-812). The balloons are described as hollow, elliptical structures "composed entirely of a single layer of minute bubbles," and it is said that they are probably produced by the anal organs as in the leaf-hoppers "but no positive observations on this point could be made." The authors do not state plainly that the bubbles contain air; in the present case, however, there are certainly no bubbles, but solid droplets probably of salivary secretion.

The behavior of these flies suggests that of the pigeon as described by Dr. E. H. Harper (*Amer. Journ. of Anat.*, 1904, vol. 3, p. 354). He says,— "There is an act which regularly precedes copulation, in which there is an apparent regurgitation of some secretion by the male which is taken from his throat by the bill of the female, in somewhat the same manner as the young birds take their food. It is a less violent manifestation than the feeding of the young however. It is easy to see that here may be one of the sources of indirect stimulation to the female reproductive organs." (Compare with the stroking of the salamander recorded in the following note.)

Specimens of the fly were preserved and through the kindness of Dr. L. O. Howard, identified as *Rivellia boscii* (Desv.).

W. H. PIERSON.

**The Spermatophores of Salamandra.**—In connection with Dr. Smith's account of the spermatophores of *Amblystoma* published in the last number of the *Naturalist*, the recent paper by W. Docters van Leeuwen is of special interest (Über die Aufnahme der Spermatophoren bei *Salamandra maculosa* Laur., *Zool. Anz.*, 1907, vol. 31, pp. 649-653). The animals observed were in confinement but the